

TITLE OF THE INVENTION

FASTENING MEMBER AND SIDING BOARDS ATTACHMENT STRUCTURE

CROSS-REFERENCES TO RELATED APPLICATIONS

5 The present application claims priority under 35 U.S.C. §119 to Japanese Patent Application No. 2000-251420, filed on August 22, 2000, entitled "FASTENING MEMBER AND SIDING BOARDS ATTACHMENT STRUCTURE". The contents of this application are incorporated herein by reference in their entirety.

BACKGROUND OF THE INVENTION

Field of the Invention

10 The present invention relates to a fastening member that is disposed at an upper rabbeted horizontal edge and a lower rabbeted horizontal edge of a siding board for mounting the siding board to a framework with an underlayment being interposed between, a siding boards attachment structure employing the same, a starter member (that is a starter) that is disposed at a lowermost end of the siding boards attachment
20 structure, and further relates to a method of attaching siding boards.

Discussion of the Background

25 Conventionally, there exists a siding boards attachment structure 90 as shown in Figs. 18 to 21 in which a plurality of siding boards 2 are fixed to a framework with an underlayment 8 being interposed between by using a fastening member 9 (Fig.

17).

In such a siding boards attachment structure 90, the fastening member 9 is disposed to bridge over a joint portion of upper and lower siding boards 2, that is, a portion between an upper rabbeted horizontal edge 21 and a lower rabbeted horizontal edge 22 of the siding boards 2 as illustrated in Figs. 19 and 21 so as to mount the siding boards 2 to the framework with the underlayment 8 being interposed between.

It should be noted that a furring strip is illustrated in Figs. 18 to 21 as the underlayment 8.

As illustrated in Figs. 17 to 21, the fastening member 9 includes a base plate portion 91 abutting on rear side surfaces 26 of siding boards 2 that are vertically disposed, a support portion 92 that is provided to erect frontward from the base plate portion 91, an upper board engaging portion 93 that is bent in an oblique upward direction from the support portion 92, and a lower board engaging portion 94 that is bent in an oblique downward direction from the support portion 92. A front flat plate portion 934 abutting on a rear surface of an overlying tongue portion 226 of a lower overlying tongue portion of the upper siding board 2 is formed in front of the upper board engaging portion 93 and the lower board engaging portion 94.

The base plate portion 91 includes a nail hole 98 and a screw hole 99 for inserting therein a nail 41 and a screw 42, respectively, for fixing the fastening member 9 to the framework with the underlayment 8 being interposed between.

As illustrated in Fig. 17, the base plate portion 91 includes a sloped portion 911 at an upper portion thereof that is curved in an oblique rearward direction and further a lower leg portion 912 at a lower end portion thereof that is bent rearward at an angle of approximately 90°. A central plate portion 913 is provided between the sloped portion 911 and the lower leg portion 912 for connecting these members and further abutting on the rear side surfaces 26 of the siding boards 2. The support portion 92 is erected from the central plate portion 913.

The nail hole 98 is formed on the sloped portion 911 and the screw hole 99 is provided on the central plate portion 913 formed between the sloped portion 911 and the support portion 92.

When the fastening member 9 is fixed to the framework with the underlayment 8 being interposed between, the fastening member 9 is fixed to the framework with the underlayment 8 being interposed between by the nail 41 or the screw 42. More particularly, when using the nail 41, the fastening member 9 is fixed to the framework by piercing the nail 41 through the nail hole 98 and driving the nail 41 to the framework with the underlayment 8 being interposed between in an oblique downward direction, as illustrated in Figs. 18 and 19.

When using the screw 42, the screw 42 is pierced through the screw hole 99 and screwed into the framework with underlayment 8 being interposed between for fixing the

fastening member 9 to the framework with the underlayment 8 being interposed between as illustrated in Figs. 20 and 21.

In this manner, the fastening member 9 is arranged so that a person performing the construction may freely select either fixing using a nail 41 (Figs. 18 and 19) or fixing using a screw 42 (Figs. 20 and 21) depending on various conditions at the time of performing construction.

However, such a fastening member 9 exhibits the following drawback.

The closer the nail 41 or the screw 42 is disposed to the support portion 92 that receives the load, the larger fixing force of the fastening member 9 to the framework against load of the siding board 2 or wind pressure is.

Thus, in case of that the nail hole 98 and the screw hole 99 are disposed at positions at which a distance from the nail hole 98 to the support portion 92 and a distance from the screw hole 99 to the support portion 92 are different, the fixing force against load or wind pressure will differ between fixing by the nail 41 and fixing by the screw 42.

In the fastening member 9, the nail hole 98 is formed on the sloped portion 911 while the screw hole 99 is formed on the central plate portion 913, respectively (Fig. 17). That is, the nail hole 98 is remoter from the support portion 92 than the screw hole 99. Thus, the fixing force when fixing is performed by the nail 41 (Figs. 18 and 19) will be smaller than the fixing force when fixing is performed by the screw 42 (Figs.

20 and 21).

In the siding boards attachment structure 90 employing the fastening member 9, there is a difference in fastening forces of the siding board 2 to the framework between using the nail 41 and using the screw 42. Consequently, performances such as wind pressure-resistance and others will vary depending on means for fixing the fastening member 9.

In order to prevent producing partial differences in fastening force of siding boards in a single building, it will be necessary to unify the fixing means for performing construction, either the nail 41 or the screw 42. Further it is not preferable that differences in fastening forces of siding boards exist between each building. It will therefore be necessary to unify the fixing means for performing construction when a plurality of buildings are built.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a fastening member which causes hardly any differences in fastening force of siding boards owing to differences in means for fixing the fittings to a building frame, an exterior wall construction structure using the same, a starter member, and further a method of attaching siding boards.

According to one aspect of the invention, a fastening member is disposed to bridge over an upper rabbeted horizontal edge of a lower siding board and a lower rabbeted horizontal

edge of an upper siding board for mounting the siding boards to a framework of a building with an underlayment being interposed between,

wherein the fastening member includes a base plate portion abutting on rear side surfaces of siding boards that are vertically disposed, a support portion that is provided to erect frontward from the base plate portion, an upper board engaging portion that is bent in an oblique upward direction from the support portion, and a lower board engaging portion that is bent in an oblique downward direction from the support portion,

wherein the base plate portion includes a nail hole and a screw hole through which a nail and a screw are respectively pierced for fixing the fastening member to the framework, and

wherein the nail hole and the screw hole are provided at position at which a distance from the nail hole to the support portion and a distance from the screw hole to the support portion are substantially equal.

It is a notable point of the present invention that the nail hole and the screw hole are provided at position at which a distance from the nail hole to the support portion and a distance from the screw hole to the support portion are substantially equal. That is, a vertical distance A from a central plane of the support portion to the nail hole and a vertical distance B from the central plane of the support portion to the screw hole are substantially equal (see Fig.

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2(B)).

It should be noted that the following explanations will be made supposing that a side of the fastening member itself on which the nail hole is formed is the "upper" side and the opposite side is the "lower" side, when viewed from the support portion, for defining respective names of portions.

The screw hole is formed on the side which is opposite to the nail hole. That is, since the screw hole is provided downward of the support portion, the direction of the fastening member needs to be turned upside down when performing fixing using the screw. In this case, the upper board engaging portion will engage the lower siding board and the lower board engaging portion will engage the upper siding board (see Fig. 6).

With this arrangement, the positional relationship of the nail and the screw from the support portion will be substantially identical with no matter which the nail or the screw is used.

Working effects of the present invention will now be explained.

As explained above, the nail hole and the screw hole are disposed in the above fastening member at positions at which distances between the holes and the support portion are substantially equal. Thus, there is almost no differences in fixing force against load of the upper siding board or wind pressure between fixing the fastening member by the nail and fixing the fastening member by the screw.

There is almost no differences in fastening force of siding boards between fixing the fastening member by the nail and fixing the fastening member by the screw when arranging the exterior wall construction structure. That is, no drawbacks such as isolation or falling off of siding boards are caused by changing means for fixing the fastening member. For instance, performances such as wind pressure-resistance of siding boards attachment structures will not vary depending on means for fixing the fastening member.

The fastening member is further advantaged in that easy construction is enabled since a person performing the construction may freely select the fixing means, either nails or screws, in accordance with various conditions at the time of constructions.

As explained so far, it is possible to provide a fastening member with which hardly any differences in fastening force of siding boards are caused owing to differences in means for fixing the fastening member to the framework.

BRIEF DESCRIPTION OF THE DRAWINGS

A more complete appreciation of the invention and many of the attendant advantages thereof will become readily apparent with reference to the following detailed description, particularly when considered in conjunction with the accompanying drawings, in which:

Fig. 1 is a perspective view of a fastening member

according to Embodiment 1;

Fig. 2(A) is a front view of the fastening member according to Embodiment 1;

Fig. 2(B) is a sectional view seen from a direction as indicated by the arrow along line C-C of Fig. 2(A);

Fig. 3 is a perspective explanatory view of a siding boards attachment structure in which the fastening member of Embodiment 1 is fixed to an underlayment by a nail;

Fig. 4 is a longitudinal sectional explanatory view of the siding boards attachment structure in which the fastening member of Embodiment 1 is fixed to an underlayment by a nail;

Fig. 5 is a perspective explanatory view of a siding boards attachment structure in which the fastening member of Embodiment 1 is fixed to an underlayment by a screw;

Fig. 6 is a longitudinal sectional explanatory view of the siding boards attachment structure in which the fastening member of Embodiment 1 is fixed to an underlayment by a screw;

Fig. 7 is a perspective view of a siding board of Embodiment 1;

Fig. 8 is a longitudinal sectional view of a lower end portion of the siding boards attachment structure of Embodiment 1;

Fig. 9 is a perspective view of a starter member of Embodiment 1;

Fig. 10(A) is a perspective view of a crown plate of the starter member of Embodiment 1;

Fig. 10(B) is a perspective view of a notched groove of a leg plate of Embodiment 1;

Fig. 11 is a perspective view of a fastening member of Embodiment 2;

5 Fig. 12 is a perspective view of a fastening member of Embodiment 3;

Fig. 13 is a perspective view of a crown plate of the starter member of Embodiment 4;

Fig. 14 is a front view of a fastening member of Embodiment 5;

Fig. 15 is a perspective explanatory view of a siding boards attachment structure of Embodiment 5;

Fig. 16 is a lateral sectional explanatory view of a siding boards attachment structure of Embodiment 5;

15 Fig. 17 is a perspective view of a fastening member according to the prior art;

Fig. 18 is a perspective explanatory view of a siding boards attachment structure in which the fastening member of the prior art is fixed to an underlayment by a nail;

20 Fig. 19 is a longitudinal sectional explanatory view of the siding boards attachment structure in which the fastening member of the prior art is fixed to an underlayment by a nail;

Fig. 20 is a perspective explanatory view of a siding boards attachment structure in which the fastening member of the prior art is fixed to an underlayment by a screw; and

25 Fig. 21 is a longitudinal sectional explanatory view of

the siding boards attachment structure in which the fastening member of the prior art is fixed to an underlayment by a screw.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

5 The preferred embodiments will now be described with reference to the accompanying drawings, wherein like reference numerals designate corresponding or identical elements throughout the various drawings.

10 It is preferable that the base plate portion includes an upper abutting portion and a lower abutting portion that abut the underlayment at its upper and lower portion, an upper rising portion and a lower rising portion that are respectively formed in a frontward rising manner from the upper abutting portion and the lower abutting portion, and a central plate portion
15 being installed to connect the upper rising portion and the lower rising portion and abutting against the rear side surfaces of the siding boards, wherein the support portion is formed to be erected from the central plate portion.

20 With this arrangement, the siding boards may be mounted to the framework with a clearance formed between the rear side surfaces of the siding boards and the underlayments. A ventilation layer will be accordingly formed between the siding boards and the underlayments for improving the durability of the siding boards attachment structure.

25 It is further preferable that the upper rising portion and the lower rising portion include a horizontal plane portion

that is arranged to form a substantially right angle with respect to the central plate portion.

With this arrangement, it is possible to obtain a fastening member which is easy to be constructed.

5 For fixing the fastening member to the framework, the fastening member is first engaged at the lower siding board. More particularly, the upper rabbeted horizontal edge of the lower exterior wall plate is inserted into space formed by the central plate portion, the support portion and the lower board engaging portion of the fastening member.

By engaging the lower board engaging portion at the upper rabbeted horizontal edge of the siding board and hitting the fastening member from above by a hammer or the like, the upper rabbeted horizontal edge of the siding board and the fastening member are fitted.

As described above, since the fastening member includes the horizontal plane portion in the upper rising portion and the lower rising portion thereof, the horizontal plane portion may be hit from above. With this arrangement, the fastening member may be easily and reliably fitted to the siding board.

In case of that the fastening member is used with the nail hole being positioned above the support portion, the fastening member is fitted to the siding board by hitting the horizontal plane portion formed in the upper rising portion. On the other hand, in case of that the fastening member is used with the screw hole being positioned above the support portion, the fastening

member is fitted to the siding board by hitting the horizontal plane portion formed in the lower rising portion.

It is preferable that the fastening member includes protruding portions projecting frontward from an upper end of the upper abutting portion and from a lower end of the lower abutting portion (see Fig. 12).

With this arrangement, similarly, the fastening member may be easily and reliably fitted to the siding board by hitting the protruding portion.

It is further preferable that the upper rising portion includes a sloped portion wherein the nail hole is formed on the sloped portion.

With this arrangement, the nail may be pierced through the nail hole and be driven to the framework with the underlayment being interposed between in an oblique downward direction. Thus, the fastening member may be reliably fixed to the framework and reliably engaged at the lower siding board.

It is preferable that the upper abutting portion and the lower abutting portion include an abutting surface that is substantially horizontal to the central plate portion (see Figs. 1 and 11).

With this arrangement, a contact surface of the upper abutting portion and the lower abutting portion with the underlayment may be large, and it is possible to prevent the upper abutting portion and the lower abutting portion from being buried into the underlayment. More particularly, also in case

of that the underlayment is a soft material such as a foamed plastic resin board, the upper abutting portion and the lower abutting portion of the fastening member will not be buried into the underlayment, and it is possible to prevent the fastening member from sinking into the underlayment.

Thus, the siding boards may be stably fastened to the framework with the underlayment being interposed between.

It is preferable that the fastening member is of a shape that is elongated in lateral directions such that a plurality of studs of the framework that are disposed in a laterally aligned manner may be connected and fixed (see Figs. 14 and 15).

With this arrangement, laterally arranged siding boards may be reliably mounted to the framework also in case of that left rabbeted vertical edges or right rabbeted vertical edges of the siding boards are not disposed on the studs of the framework.

More particularly, in case of that such a fastening member is employed for a siding boards attachment structure using a wood frame construction, it is necessary to dispose the fastening member at a portion at which a stud is provided for securing strength. On the other hand, the fastening member needs to be disposed on the upper rabbeted horizontal edge and the lower rabbeted horizontal edge on a corner portion of the siding board.

At this time, in case of that the left rabbeted vertical edge or the right rabbeted vertical edge of the siding board

is not disposed on the stud, that is, in case of that the corner portion of the siding board is not disposed on the portion where a stud is present, the fastening member may not be disposed on a portion where the stud is present and the corner portion of the siding board is located in case of that the fastening member is short.

Thus, by arranging the fastening member to be a shape that is elongated in lateral directions for enabling connection and fixing of a plurality of studs, it will be possible to arrange a siding boards attachment structure exhibiting satisfactory strength.

According to another aspect of the invention, a siding boards attachment structure includes a fastening member being disposed on an upper rabbeted horizontal edge and a lower rabbeted horizontal edge of a siding board for mounting the siding board to a framework of a building with an underlayment being interposed between,

wherein the fastening member includes a base plate portion abutting against rear side surfaces of siding boards that are vertically disposed, a support portion that is provided to erect frontward from the base plate portion, an upper board engaging portion that is bent in an oblique upward direction from a front end portion of the support portion, and a lower board engaging portion that is bent in an oblique downward direction from the support portion,

wherein the base plate portion includes a nail hole and

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a screw hole through which a nail and a screw for fixing the fastening member to the framework are pierced and that are disposed at positions at which a distance from the nail hole to the support portion and a distance from the screw hole to the support portion become substantially equal,

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wherein the fastening member is arranged such that the nail hole is disposed upward of the support portion with the nail being fixed while being pierced through the nail hole in case of that the fastening member is fixed to the framework by the nail, and

wherein the fastening member is arranged such that the screw hole is disposed upward of the support portion with the screw being fixed while being pierced through the screw hole in case of that the fastening member is fixed to the framework by the screw.

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The screw hole of the above fastening member is formed downward of the support portion. Thus, when performing fixing by the screw, the direction of the fastening member is turned upside down. In this case, the upper board engaging portion will engage the lower siding board while the lower board engaging portion will engage the upper siding board (see Fig.

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In the siding boards attachment structure, the distances from the support portion to the nail and to the screw are substantially equal, in the cases of that fastening member is fixed by the nail and that the fastening member is fixed by the

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screw.

Thus, hardly any differences in fixing force are caused in case the fastening member is fitted by the nail and by the screw. In other word, hardly any differences in fastening force of siding boards will be caused depending on means for fixing the fastening member.

Thus, it is possible to provide a siding boards attachment structure with hardly any differences in fastening force of siding boards being caused depending on means for fixing to the framework.

It is preferable that the base plate portion of the fastening member includes an upper abutting portion and a lower abutting portion that abut the underlayment at its upper and lower portion, an upper rising portion and a lower rising portion that are respectively formed in a frontward rising manner from the upper abutting portion and the lower abutting portion, and a central plate portion for connecting between the upper rising portion and the lower rising portion and further abutting against the rear side surfaces of the siding boards, wherein the support portion is formed to erect from the central plate portion.

With this arrangement, a ventilation layer will be formed between the siding boards and the underlayments for improving the durability of the siding boards attachment structure.

It is further preferable that the upper rising portion and the lower rising portion include a horizontal plane portion

that is arranged to form a substantially right angle with respect to the central plate portion.

As described above, by hitting the horizontal plane portion when fitting the fastening member to the upper rabbeted horizontal edge of the siding board at the time of construction, fitting may be easily and reliably performed. It is thus possible to obtain a fastening member enabling easy construction.

It is preferable that the fastening member includes a protruding portion projecting frontward from an upper end of the upper abutting portion and from a lower end of the lower abutting portion.

With this arrangement, the fastening member may be similarly fitted to the siding board in an easy and reliable manner by hitting the protruding portion.

It is further preferable that the upper rising portion includes a sloped portion wherein the nail hole is formed on the sloped portion.

With this arrangement, pressurizing force of the nail that is directed in an oblique downward direction with respect to the framework will act on the fastening member when using the nail. It is thus possible to obtain a siding boards attachment structure in which the fastening member is reliably fixed to the framework and in which it is reliably engaged at the lower siding board.

It is preferable that the upper abutting portion and the

lower abutting portion include an abutting surface that is substantially horizontal to the central plate portion.

With this arrangement, it is possible to prevent the upper abutting portion and the lower abutting portion from cutting
5 into the underlayment, and to prevent the fastening member from sinking into the underlayment.

It is thus possible to obtain a siding boards attachment structure in which siding boards are stably fastened to the framework with the underlayment being interposed between.

It is preferable that the fastening member is fixed to connect a plurality of studs of the framework that are disposed to be laterally aligned such that two adjoining siding boards are engaged by a single fastening member.

With this arrangement, it is possible to obtain a siding boards attachment structure exhibiting satisfactory strength
10 also in case a left rabbeted vertical edge or a right rabbeted vertical edge of the siding board is not disposed on the stud of the framework.

The siding boards attachment structure is preferably a
20 constructing structure employing a framework wall construction method.

With this arrangement, it is possible to obtain a siding boards attachment structure enabling easy construction. It is also possible to obtain a siding boards attachment structure
25 exhibiting satisfactory strength.

It should be noted that details of the framework wall

construction method will be described later.

It is preferable that a lower rabbeted horizontal edge of a lowermost siding board is located to be remote from the ground surface.

5 With this arrangement, it is possible to prevent the lowermost siding board from absorbing moisture directly from the ground surface, thus corrosion or degradation of the siding board can be prevented.

Thus, it is possible to obtain a siding boards attachment structure exhibiting superior durability.

It is further preferable that a starter member that is fixed to the framework together with the lowermost fastening member is disposed at a lowermost end of the siding boards attachment structure.

15 With this arrangement, it is possible to reliably obtain a siding boards attachment structure with the lowermost siding board being remote from the ground surface by a specified distance. Since a continuous footing of the siding boards attachment structure may be hidden thereby, the external
20 appearance of design may also be improved.

The starter member preferably includes a leg plate that is located to be proximate to the ground surface, a bottom plate abutting against a lower end portion of the fastening member, and a back plate to be fixed to the framework,

25 wherein the leg plate is of a length that is substantially identical to a distance between the exterior wall plate mounted

to the fastening member and the ground surface.

The "lower end portion of the fastening member" denotes an end portion that is located downward when the fastening member is disposed at the framework.

5 More particularly, when fixing the fastening member by a nail, the lower end of the lower abutting portion of the fastening member abuts on the bottom plate of the starter member (see Fig. 8), and when fixing the fastening member by a screw, the direction of the fastening member is turned upside down so that an upper end of the upper abutting portion abuts on the bottom plate.

15 With this arrangement, it is possible to obtain more easily and reliably a siding boards attachment structure in which the siding board at the lowermost end is remote from the ground surface by a specified distance.

According to another aspect of the invention, a starter member is used together with a lowermost fastening member and is disposed at a lower end portion of a siding boards attachment structure,

20 wherein the starter member includes a leg plate that is located proximate to the ground surface, a bottom plate abutting against a lower end portion of the fastening member, and a back plate to be fixed to the framework,

25 wherein the leg plate is in a length that is substantially identical to a distance between the exterior wall plate mounted to the fastening member and the ground surface (see Figs. 8 and

9) .

By using the starter member of the present invention, the siding board at the lowermost end may be easily and reliably constructed to be remote from the ground surface by a specified distance. The starter member is further capable of hiding a continuous footing of the siding boards attachment structure, thus the external appearance of design can be improved.

It is preferable that the starter member includes a crown plate projecting frontward from the back plate for abutting against a rear side surface of the siding board.

With this arrangement, the starter member may be easily and stably constructed.

The crown plate preferably includes ventilating holes.

With this arrangement, outside air is introduced to between the rear side surfaces of the siding boards and the underlayments so that ventilation of the interior of the siding boards attachment structure may be permanently performed. Thus, the durability of the siding boards attachment structure may be improved.

It is preferable that the ventilating holes are covered with mesh-like bodies.

With this arrangement, it is possible to prevent vermin such as termites or bees from entering the rear side of the siding board through the ventilating holes. Thus, it is possible to prevent degradations of the siding board, underlayment, the framework and the like.

It is preferable that the leg plate is formed with a notched groove for adjusting its length.

With this arrangement, the leg plate may be cut at the notched groove for easily adjusting the length thereof.

5 The notched groove is preferably formed at a plurality of spots. In this case, the length of the leg plate may be adjusted in accordance with various conditions for constructions such that the siding boards attachment structure may be constructed.

10 According to the other aspect of the invention, a method of attaching siding boards includes

15 a first process of fixing a fastening member at a lowermost stage of the siding boards attachment structure to a framework with an underlayment being interposed between by a nail or a screw,

20 a second process of engaging a lower rabbeted horizontal edge of a siding board at the fastening member for disposing the siding board with the rear side surface thereof opposing to the framework, and

25 a third process of disposing another fastening member to an upper rabbeted horizontal edge of the siding board and fixing the fastening member to the framework with the underlayment being interposed between by a nail or a screw,

wherein the second process and third process are

sequentially repeated after performing the third process,

wherein in case of that nails are used in the first process

and third process, the nail hole is disposed upward of the support portion for engaging the fastening member to a lower siding board and the nail is pierced through the nail hole for fixing the fastening member to the framework with the

5 underlayment being interposed between,

pub B11 while in case of that screws are used in the first process and third process, the screw hole is disposed upward of the support portion for engaging the fastening member to a lower siding board and the screw is pierced through the screw hole for fixing the fastening member to the framework with the underlayment being interposed between.

pub B12 It is a notable point of the method of attaching siding boards that in case of that the fastening member is fixed by nails in the first process and third process, the nail hole is disposed upward of the support portion while the screw hole is disposed upward of the support portion in case of that the fastening member is fixed by screws.

pub B13 Thus, in case of that the screw hole is provided downward of the support portion, that is, on an opposite side of the nail hole, the direction of the fastening member needs to be turned upside down when fixing is performed with the screw in contrast to a case in which fixing is performed with the nail. In this case, the upper board engaging portion will engage the lower siding board and the lower board engaging portion will engage the upper siding board.

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the support portion will be substantially identical, when the nail and the screw is used. Thus the fixing force of the fastening member to the framework will be stable.

Thus, according to the above method of constructing exterior walls, it is possible to construct a siding boards attachment structure with which hardly any differences in fastening force of siding boards will be caused owing to differences in means for fixing the fastening member to the framework.

Embodiment 1

The fastening member and the siding boards attachment structure according to embodiments of the present invention will now be explained with reference to Figs. 1 to 10(B).

Figs. 1, 2(A) and 2(B) are explanatory views of a fastening member 1 of the present example, Figs. 3 to 6 are explanatory views of a siding boards attachment structure 7 using the fastening member 1, Fig. 7 is an explanatory view of a siding board 2 used in the siding boards attachment structure 7, and Figs. 8 to 10(B) are explanatory views of a starter member 6 used in the siding boards attachment structure 7.

It should be noted that as mentioned above, the following explanations will be made supposing that a side of the fastening member 1 itself on which a nail hole 18 is formed is an "upper" portion and the opposite side is a "lower" portion, when viewed from the support portion, for defining respective names of

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portions.

As illustrated in Figs. 3 to 6, the fastening member 1 is disposed to bridge from an upper rabbeted horizontal edge 21 of a siding board 2 that is disposed on a lower side to a lower rabbeted horizontal edge 22 of a siding board 2 that is disposed on an upper side, and is for mounting the siding boards 2 to a stud 31 (framework) with an underlayment 3 being interposed between.

As illustrated in Figs. 1 to 4, the fastening member 1 includes a base plate portion 11 abutting against rear side surfaces 26 of siding boards 2 that are vertically disposed, a support portion 12 that is provided to erect frontward from the base plate portion 11, an upper board engaging portion 13 that is bent upward from the support portion 12, and a lower board engaging portion 14 that is bent downward from the support portion 12. A front flat plate portion 134 abutting against a rear surface of an overlying tongue portion 226 of a lower overlying tongue portion of the upper siding board 2 is formed frontward of the upper board engaging portion 13 and the lower board engaging portion 14.

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The base plate portion 11 includes a nail hole 18 and a screw hole 19 for piercing a nail 41 and a screw 42, respectively, through for fixing the fastening member 1 to the framework with the underlayment 3 being interposed between.

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As illustrated in Fig. 2(B), the nail hole 18 and the screw hole 19 are provided at positions where distances from the nail

hole 18 and the screw hole 19 to the support portion 12 are substantially equal. More particularly, a vertical distance A from a central plane of the support portion 12 to the nail hole 18 and a vertical distance B from the central plane of the support portion 12 to the screw hole 19 are substantially equal.

As illustrated in Figs. 1, 2(A), 2(B), 4 and 6, the base plate portion 11 includes an upper abutting portion 111 and a lower abutting portion 112 that abut on the underlayment 3 at its upper and lower portion. It further includes an upper rising portion 113 and a lower rising portion 114 that are respectively formed in a frontward rising manner from the upper abutting portion 111 and the lower abutting portion 112.

The base plate portion 11 further includes a central plate portion 115 for connecting the upper rising portion 113 and the lower rising portion 114 and further abutting against the rear side surfaces 26 of the siding boards 2, wherein the support portion 12 is formed to erect from the central plate portion 115.

As illustrated in Figs. 1 and 2(B), the upper rising portion 113 and the lower rising portion 114 include horizontal plane portions 15, 16 that are arranged at a substantially right angle with respect to the central plate portion 115.

The upper rising portion 113 includes a sloped portion 17 wherein the nail hole 18 is formed on the sloped portion 17. The upper abutting portion 111 and the lower abutting portion 112 include abutting surfaces 116 and 117 that are substantially

horizontal to the central plate portion 115.

The fastening member 1 is manufactured by, for instance, extrusion molding of aluminum.

The siding boards attachment structure 7 using the fastening member 1 will now be explained with reference to Figs. 3 to 8.

As illustrated in Figs. 3 to 6, the siding boards attachment structure 7 is arranged by disposing the fastening member to bridge from the upper rabbeted horizontal edge 21 of the lower siding board 2 and the lower rabbeted horizontal edge 22 of the upper siding board 2 for mounting the siding boards 2 to the stud 31 of the framework with the underlayment 3 being interposed between.

As illustrated in Figs. 3 and 4, in case of that the fastening member 1 is fixed to the stud 31 with the underlayment 3 being interposed between by the nail 41, the nail hole 18 is disposed upward of the support portion 12 and the nail 41 is pierced through the nail hole 18 and driven in an oblique downward direction for fixing.

On the other hand, as illustrated in Figs. 5 and 6, in case of that the fastening member 1 is fixed to the stud 31 with the underlayment 3 being interposed between by the screw 42, the screw hole 19 is disposed upward of the support portion 12 and the screw 42 is pierced through the screw hole 19 and screwed in a horizontal direction for fixing.

The siding board 2 constructing the siding boards

attachment structure 7 is a siding board of a four side (left, right, upper and lower sides) shiplap structure as illustrated in Fig. 7. More particularly, the siding board 2 includes an upper underlying tongue portion at the upper rabbeted

horizontal edge 21, a lower overlying tongue portion at the lower rabbeted horizontal edge 22, a lateral underlying tongue portion at a right rabbeted vertical edge 23 and a lateral overlying tongue portion at a left rabbeted vertical edge 24. Caulking materials 29 for preventing penetration of water from joint portions of siding boards 2 after construction are attached on a front surface of the upper underlying tongue portion and a front surface of the lateral underlying tongue portion.

As illustrated in Fig. 8, a distance H between the lower rabbeted horizontal edge 22 of a siding board 2 that is disposed at a lowermost stage and the ground surface 5 is set to be, for instance, 6 inches in the siding boards attachment structure 7. As a means thereof, the starter member 6 is disposed at the lowermost end of the siding boards attachment structure 7 together with the fastening member 1 at the lowermost end.

As illustrated in Figs. 8 and 9, the starter member 6 includes a leg plate 61 abutting the ground surface 5, a bottom plate 62 abutting the lower end portion of the fastening member 1, and a back plate 63 for fixing on the underlayment 3.

The bottom plate 62 is arranged at a position at which it is substantially the same height as the siding board 2 that

is mounted to the fastening member 1 is to be disposed remote from the ground surface 5 as in the above-explained manner. That is, the bottom plate 62 is formed at a position at which a distance Δ from a lower end portion 612 of the starter member 6 is, for instance, approximately 6 inches.

The lower end portion of the leg plate 61, that is, the lower end portion 612 of the starter member 6 is bent backward to form a plane portion on a substantially identical plane as the back plate 63 and is located to be proximate to the ground surface 5 for improving the external appearance of design.

The starter member 6 includes a crown plate 64 projecting frontward from the back plate 63 and abutting against rear side surfaces 26 of the siding boards 2. As illustrated in Figs. 8 and 9, the crown plate 64 includes a front flat plate portion 641 at a front end portion thereof and is provided with ventilating holes 65 as illustrated in Fig. 10(A).

As illustrated in Figs. 9 and 10(B), the leg plate 61 is formed with a notched groove 611 at a specified position such that its length is adjustable in accordance with conditions at construction sites. The notched groove 611 may be formed in a horizontal manner at a position, for example, 4 inches from the lower end portion of the leg plate 61.

The siding boards attachment structure 7 (Figs. 3 to 8) is a constructing structure employing a framework wall construction method, and in case of performing construction, the framework is assembled in the following manner.

That is, a plurality of square timbers in which sectional dimensions are identical are used for first assembling a plurality of wall frameworks 30. The square timber generally has a sectional dimension of 2x4 inches, and intervals between studs 31 of the wall frameworks 30 may be, for instance, 16, 20 and 24 inches.

These wall frameworks 30 are assembled on a continuous footing 300 as a framework of a building (Fig. 8).

As illustrated in Figs. 3 to 6, underlayments 3 made, for instance, of foamed plastic resin boards having a thickness of 12 mm, are fixed to the wall frameworks 30 from outside of the framework by using nails of lengths of approximately 30 mm. This is a simple constructing method in which construction of heat-insulating materials is completed at the time of constructing the siding boards without forming bearing walls.

It should be noted that oriented strand boards (OSBs) can be used as the underlayments 3.

Particularly, the siding boards 2 are fastened to the assembled wall frameworks 30, that is, the framework (studs 31) with the underlayments 3 being interposed between in the following manner.

In a first process, the fastening member 1 at the lowermost stage of the siding boards attachment structure 7 is fixed to a sill 32 with the underlayment 3 being interposed between as illustrated in Fig. 8.

In this case, waterproof paper 33 is adhered to an outside

surface of the underlayment 3 by using a double-faced adhesive tape or the like. Then, the starter member 6 is disposed such that the lower end portion 612 thereof is proximate to the ground surface 5 and the fastening member 1 is mounted on the bottom plate 62 of the starter member 6 for fixing the fastening member 1 to the sill 32 with the underlayment 3 being interposed between (Fig. 8).

In case of that the fastening member 1 is fixed to the underlayment 3 by the nail 41, the nail hole 18 is disposed upward of the support portion 12 and the nail 41 is pierced through the nail hole 18 for driving the nail 41 in an oblique downward direction for fixing the fastening member 1 to the sill 32 with the underlayment 3 being interposed between as illustrated in Fig. 8.

On the other hand, in case of that the fastening member 1 is fixed to the underlayment 3 by the screw 42, the screw hole 19 is disposed on upward of the support portion 12 and the screw 42 is pierced through the screw hole 19 for screwing the screw 42 in a horizontal direction for fixing the fastening member 1 to the sill 32 with the underlayment 3 being interposed between (see Figs. 5 and 6).

In a second process, the lower overlying tongue portion of the lower rabbeted horizontal edge 22 of a siding board 2 that is to be disposed at a lowermost stage is engaged at the upper board engaging portion 13 of the fastening member 1 to be disposed to face the underlayment 3 (see Fig. 8).

For joining laterally disposed siding boards 2, the siding boards 2 are fastened such that butt portions of the right rabbeted vertical edge 23 and the left rabbeted vertical edge 24 of the siding boards 2 are disposed at positions where studs 31 of the wall frameworks 30 are present as illustrated in Figs. 3 and 5.

In this manner, in case of joining in lateral directions, the lateral overlying tongue portion of the left rabbeted vertical edge 24 of the right siding board 2 is overlapped onto the lateral underlying tongue portion of the right rabbeted vertical edge 23 of the left siding board 2 that has been fastened before, and both are joined through right-and-left shiplap jointing, as illustrated in Figs. 3 and 5.

In a third process, another fastening member 1 is disposed on the upper rabbeted horizontal edge 21 of a siding board 2 that is disposed on the lowermost stage in the above-described manner, and is fixed to the stud 31 with the underlayment 3 being interposed between by the nail 41 or the screw 42.

As illustrated in Figs. 3 and 4, in case of fixing the fastening member 1 to the underlayment 3 by a nail 41, the nail hole 18 is disposed upward of the support portion 12 and the fastening member 1 is engaged at the upper rabbeted horizontal edge 21 of the lower siding board 2. That is, the upper rabbeted horizontal edge 21 of the lower siding board 2 is inserted into space formed by the base plate portion 11, the support portion 12, and the lower board engaging portion 14 of the fastening

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member 1.

At this time, the lower board engaging portion 14 is engaged at the upper rabbeted horizontal edge 21 of the siding board 2 and the horizontal plane portion 15 formed at the upper rising portion 113 of the fastening member 1 is lightly hit from above by a hammer or the like for fitting the fastening member 1 to the siding board 2 reliably.

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The nail 41 is then pierced through the nail hole 18 and driven in an oblique downward direction for fixing the fastening member 1 to the stud 31 with the underlayment 3 being interposed between.

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On the other hand, as illustrated in Figs. 5 and 6, in case of fixing the fastening member 1 to the underlayment 3 by a screw 42, the screw hole 19 is disposed upward of the support portion 12 and the fastening member 1 is engaged at the upper rabbeted horizontal edge 21 of the lower siding board 2. That is, the direction of the fastening member 1 is turned upside down in contrast to the above-described case in which fixing is performed by using the nail 41 (Figs. 3 and 4).

20 Then, the fastening member 1 is engaged at the upper rabbeted horizontal edge 21 of the lower siding board 2. That is, the upper rabbeted horizontal edge 21 of the lower siding board 2 is inserted into space formed by the base plate portion 11, the support portion 12, and the upper board engaging portion 25 13 of the fastening member 1.

At this time, the upper board engaging portion 13 is

engaged at the upper rabbeted horizontal edge 21 of the siding board 2 and the horizontal plane portion 16 formed at the lower rising portion 114 of the fastening member 1 is lightly hit from above by a hammer or the like for fitting the fastening member 1 to the upper rabbeted horizontal edge 21 of the siding board 2 reliably.

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The screw 42 is then pierced through the screw hole 19 and screwed in a horizontal direction for fixing the fastening member 1 to the stud 31 with the underlayment 3 being interposed between.

In this manner, in case of joining in vertical directions as illustrated in Figs. 4 and 6, the lower overlying tongue portion of the lower rabbeted horizontal edge 22 of the upper siding board 2 is overlapped onto the upper underlying tongue portion of the upper rabbeted horizontal edge 21 of the lower siding board 2 that has been fastened before, and both are joined through an upper-and-lower shiplap jointing.

After completing the third process, the same processes as the second process and third process are sequentially repeated.

The working effect of the present example will be explained.

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In the above fastening member 1, the nail hole 18 and the screw hole 19 are disposed at positions where a distance from the nail hole 18 to the support portion 12 and a distance from the screw hole 19 to the support portion 12 become substantially

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cont

equal (Figs. 2(A), 2(B)). Thus, hardly any differences are caused in fixing force of the upper siding board 2 against load or wind pressure in case of fixing the fastening member 1 by the nail 41 (Figs. 3 and 4) and the case of fixing the fastening member 1 by the screw 42 (Figs. 5 and 6).

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Thus, hardly any differences are caused in fastening force of the siding boards 2 when constructing the siding boards attachment structure 7 by fixing the fastening member 1 by using either the nail 41 or the screw 42. In other words, hardly any differences are caused in fixing force of the upper siding board 2, no matter whether the siding boards attachment structure 7 is constructed by fixing the fastening members 1 using only nails 41 or the siding boards attachment structure 7 is constructed by fixing the fastening members 1 using only screws 42.

More particularly, no drawbacks such as isolation or falling off of siding boards 2 will be caused by varying the means for fixing the fastening members 1. Particularly performances such as wind-pressure resistance of the siding boards attachment structure 7 will not be varied depending on means for fixing the fastening members 1.

Since a person performing the construction may freely select the fixing means for the fastening members 1, that is, nails 41 or screws 42, in accordance with various conditions in performing construction, easy construction is enabled.

The base plate portion 11 of the fastening member 1

includes the upper abutting portion 111, the lower abutting portion 112, the upper rising portion 113, the lower rising portion 114, and the central plate portion 115.

With this arrangement, a ventilation layer 71 is formed between the rear side surfaces 26 of the siding boards 2 and the underlayments 3 in the siding boards attachment structure 7 as illustrated in Figs. 4, 6 and 8, so that condensation is prevented and the durability of the siding boards attachment structure 7 is improved.

As illustrated in Figs. 8, 9 and 10(A), ventilating holes 65 are formed in the crown plate 64 of the starter member 6 disposed at the lowermost end of the siding boards attachment structure 7.

Therefore, outside air 79 from below is introduced to the ventilation layer 71 through the ventilating holes 65 and the introduced outside air 79 is exhausted from above.

With this arrangement, it is possible to prevent accumulation of humidity on rear sides of the siding boards 2 or on the underlayments 3, and corrosion of the underlayments 3 or studs 31 will not occur so that it is possible to improve the durability of the siding boards attachment structure 7 largely.

Since the upper rising portion 113 and the lower rising portion 114 of the fastening member 1 includes horizontal plane portions 15, 16 that are arranged to form a substantially right angle with respect to the central plate portion 115, easy construction is enabled.

More particularly, by hitting the horizontal plane portion 15 or 16 lightly by a hammer or the like when fitting the upper rabbeted horizontal edge 21 of the lower siding board 2 to the fastening member 1 in the above-described manner, reliably fitting with the fastening member 1 is enabled in an easy manner.

Since the upper rising portion 113 includes a sloped portion 17 on which the nail hole 18 is formed, the nail 41 may be pierced through the nail hole 18 to be driven into an oblique downward direction with respect to the stud 31 with the underlayment 3 being interposed between (Fig. 4). Thus, the fastening member 1 may be reliably fixed to the stud 31 with the underlayment 3 being interposed between and further be reliably engaged to the lower siding board 2.

The upper abutting portion 111 and the lower abutting portion 112 includes abutting surfaces 116 and 117. Thus, the contact surface of the upper abutting portion 111 and the lower abutting portion 112 with the underlayment 3 may be large so as to prevent cutting of the upper abutting portion 111 and the lower abutting portion 112 into the underlayment 3.

That is, the provision of the abutting surfaces 116, 117 at the upper abutting portion 111 and the lower abutting portion 112 of the fastening member 1 will prevent cutting of the upper abutting portion 111 and the lower abutting portion 112 into the underlayments 3 though the underlayments 3 are made of foamed resin panels to be soft materials. Thus, it is possible

to prevent the fastening member 1 from sinking into the underlayments 3.

Thus, the siding boards 2 may be fastened to the studs 31 stably with the underlayments 3 being interposed between.

5 Since the siding boards attachment structure 7 is a construction structure employing the framework wall construction method, easy construction is enabled.

10 The lower rabbeted horizontal edge 22 of the siding board 2 at the lowermost stage of the above siding boards attachment structure 7 is remote from the ground surface 5 (Fig. 8). Thus, it is possible to prevent the lowermost siding board 2 from absorbing moisture directly from the ground surface 5. Thus corrosion or degradation of the siding board 2 may be prevented. It is therefore possible to obtain a siding boards attachment structure 7 exhibiting superior durability.

15 More particularly, since the starter member 6 is disposed at the lowermost end of the siding boards attachment structure 7 together with the fastening member 1 at the lowermost end, it is possible to reliably obtain a siding boards attachment structure 7 in which the siding board 2 of the lowermost stage is remote from the ground surface 5 by a specified distance. Since the continuous footing 300 is hidden by the starter member 6, it is also possible to exhibit superior external appearance of design.

20 The provision of the crown plate 64 of the starter member 6 that abuts the rear side surface 26 of the siding board 2,

the starter member 6 may be constructed in an easy and stable manner.

Since the crown plate 64 is provided with ventilation holes 65, outside air 79 may be introduced to the ventilation layer 71 between the rear side surfaces 26 of the siding boards 2 and the underlayments 3 such that permanent ventilation of the siding boards attachment structure 7 is enabled. Thus, the durability of the siding boards attachment structure 7 may be improved.

Since the leg plate 61 is formed with a notched groove 611 for length adjustment purposes, the leg portion 61 may be cut at the notched groove 611 in accordance with conditions for construction, thereby enabling easy adjustment to the length thereof.

As explained so far, according to the present example, it is possible to provide a fastening member and a siding boards attachment structure with which hardly any differences are caused in fastening force of the siding boards owing to differences in means for fixing (either nails or screws) to the studs 31 with the underlayments 3 being interposed between.

Embodiment 2

As illustrated in Fig. 11, the present example is an example of a fastening member 10 in which surfaces of the abutting surfaces 116 and 117 of the upper abutting portion 111 and the lower abutting portion 112 are further enlarged.

As illustrated in Fig. 11, the fastening member 10 is

formed by folding a single metallic plate such as one made of stainless steel.

At the upper end portion of the upper abutting portion 111, the metallic plate is folded back in a downward direction such that the abutting surface 116 is formed in a further downwardly elongated manner than the upper rising portion 113. The lower end portion of the lower abutting portion 112 is similarly arranged in that the metallic plate is folded back in an upward direction such that the abutting surface 117 is formed in a further upwardly elongated manner than the lower rising portion 114.

The remaining arrangements are similar to those of the Embodiment 1.

In this case, the contact surface between the underlayment and the fastening member 10 will be larger when the fastening member 10 is fixed to the framework with the underlayment interposed between. Thus, it is possible to prevent the fastening member 10 from sinking into the underlayment in an even more reliably manner also when performing fixing with underlayments of soft materials interposed between. Thus, it is possible to obtain an even more stable siding boards attachment structure.

Other working effects are similar to those of the Embodiment 1.

Embodiment 3

As illustrated in Fig. 12, the present example is an

example of a fastening member 100 in which protruding portions 101 and 102 projecting frontward are provided at an upper end of the upper abutting portion 111 and a lower end of the lower abutting portion 112.

5 The remaining arrangements are similar to those of the Embodiment 1.

10 In this case, by hitting the protruding portion 101 or 102 lightly by a hammer or the like, the fastening member 100 may be easily and reliably fitted to an upper rabbeted horizontal edge of a siding board that is disposed on a lower side.

15 When using the fastening member 100 with the nail hole 18 being positioned above the support portion 12, the fastening member 100 may be fitted to the siding board by lightly hitting the protruding portion 101 formed at the upper abutting portion 111. On the other hand, when using the fastening member 100 with the screw hole 19 being positioned above the support portion 12, the fastening member 100 may be fitted to the siding board by lightly hitting the protruding portion 102 formed at
20 the lower abutting portion 112.

Other working effects are similar to those of the Embodiment 1.

Embodiment 4

25 As illustrated in Fig. 13, the ventilation holes 65 provided on the crown plate 64 of the starter member 6 is covered by mesh-like bodies 651.

The remaining arrangements are similar to those of the Embodiment 1.

With this arrangement, it is possible to prevent vermin such as termites or bees from entering the rear side of the siding board through the ventilating holes 65. Thus, it is possible to prevent degradations of the siding board, underlayment and the like.

Other working effects are similar to those of the Embodiment 1.

Embodiment 5

As illustrated in Figs. 14 to 16, the present example is an example of fastening member 1a that is of laterally elongated shape.

Fig. 14 is a front view of the fastening member 1a, Fig. 15 is a perspective explanatory view of a siding boards attachment structure 7a using the fastening member 1a, and Fig. 16 is a lateral sectional explanatory view of the siding boards attachment structure 7a.

As illustrated in Figs. 15 and 16, the fastening member 1a is arranged such that a plurality of studs 31 of a framework that are disposed in a laterally aligned manner may be connected and fixed. More particularly, the length of the fastening member 1a in a lateral direction is set to be approximately 68 cm while the length in a vertical direction is set to be approximately 4.5 cm.

The remaining arrangements are similar to those of the

Embodiment 1.

With this arrangement, lateral siding boards 2 may be reliably mounted to the framework with the underlayment 3 being interposed between also in case the left rabbeted vertical edge 23 and the right rabbeted vertical edge 24 of the siding board 2 are not disposed on the stud 31 of the framework as illustrated in Figs. 15 and 16.

More particularly, in case of using the fastening member 1a in the siding boards attachment structure 7a employing the framework wall construction method, the fastening member 1a needs to be disposed at a portion at which the stud 31 is present for securing strength. On the other hand, the fastening member 1a needs to be disposed to bridge from the upper rabbeted horizontal edge 21 to the lower rabbeted horizontal edge 22 formed on a corner portion of the siding board 2.

At this time, when the left rabbeted vertical edge 23 or the right rabbeted vertical edge 24 of the siding board 2 is not disposed on the stud 31, that is, the corner portion of the siding board 2 is not positioned on the stud 31, the fastening member 1a can not be disposed on a portion on which the stud 31 is present and the corner portion of the siding board 2 is present in case of that the lateral length of the fastening member 1a is short.

Thus, by arranging the fastening member 1a to be of a shape that is elongated in lateral directions for enabling connection and fixing of a plurality of studs 31, it will be possible to

arrange a siding boards attachment structure 7a exhibiting satisfactory strength (Figs. 15 and 16).

Other working effects are similar to those of the Embodiment 1.

5 Obviously, numerous modifications and variations of the present invention are possible in light of the above teachings. It is therefore to be understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically described here.

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